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METHOD AND APPARATUS FOR PROCESSING ELECTRONIC RECORDS
FOR PHYSICAL TRANSACTIONS
BACKGROUND OF THE INVENTION

5   **1. Technical Field:**

The present invention relates generally to an improved data processing system, and in particular to a method and apparatus for processing data. Still more particularly, the present invention provides a method and
10   apparatus for processing electronic records.

2. Description of Related Art:

When a customer goes to a business establishment to obtain services or to purchase items, a transaction
15   occurs. This transaction is a physical transaction in which a customer travels to a business establishment and obtains services or purchases an item at the business establishment. In this transaction, details are typically present about the transaction that the customer
20   desires to obtain. For example, if a customer takes an automobile to a service station for an oil change, the customer may desire to obtain details about the transaction, such as, for example, the amount of oil used, the type of oil used, the mileage, the date of the
25   service, the price for the service, and the name of the service station.

Currently, a customer is required to obtain this information by either asking a representative of the service station for the information or by extracting the
30   information from a physical receipt from the transaction. Such an operation is time-consuming and sometimes

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frustrating for the customer. In addition to having to
actively obtain the information, the customer also is
required to enter this information into a database or
program used by the customer. For example, the customer
5   may desire to enter the information into an accounting
program that maintains records and generates budgets.

Therefore, it would be advantageous to have an
improved method and apparatus for processing information
relating to a physical transaction.

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SUMMARY OF THE INVENTION

The present invention provides a method and
5   apparatus for processing transactions. In particular,
the mechanism of the present invention is used for
processing information for physical transactions. A data
structure is received at a customer data processing
system for a physical transaction entered into by the
10 customer. This information is extracted and used to
update records or other information in the customer data
processing system. Further, a second data structure is
sent to a supplier of an item used in the physical
transaction. This data structure is used by the supplier
15 to update information maintained by the supplier about
the item. After updating the information, the
information is analyzed to generate statistics about
physical transactions involving the item.

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BRIEF DESCRIPTION OF THE DRAWINGS

5   The novel features believed characteristic of the
invention are set forth in the appended claims. The
invention itself, however, as well as a preferred mode of
use, further objectives and advantages thereof, will best
be understood by reference to the following detailed
description of an illustrative embodiment when read in
10   conjunction with the accompanying drawings, wherein:

Figure 1 depicts a diagram of entities involved in
processing data for physical transactions in accordance
with a preferred embodiment of the present invention;
15   Figure 2 is a pictorial representation of a network
of data processing systems in which the present invention
may be implemented;
Figure 3 is a block diagram of a data processing
system that may be implemented as a server in accordance
20   with a preferred embodiment of the present invention;
Figure 4 is a block diagram illustrating a data
processing system in which the present invention may be
implemented;
Figure 5 is a diagram of a client in the form of a
25   personal digital assistant (PDA) in accordance with a
preferred embodiment of the present invention;
Figure 6 is a block diagram of a PDA in accordance
with a preferred embodiment of the present invention;
Figure 7 is an illustration of an entry for a data
30   structure in accordance with a preferred embodiment of
the present invention;
Figure 8 is a data structure illustrated in

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accordance with a preferred embodiment of the present invention;

Figure 9 is a flowchart of a process used for importing data structures in accordance with a preferred embodiment of the present invention;

Figure 10 is a flowchart of a process used by a business entity for creating data structures in accordance with a preferred embodiment of the present invention; and

Figure 11 is a flowchart of a process used by a supplier to receive and process data structures in accordance with a preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

  With reference now to the figures, **Figure 1** depicts a
5 diagram of entities involved in processing data for
physical transactions in accordance with a preferred
embodiment of the present invention. In this example, a
customer, such as customer **100** or customer **102** may obtain
services or items from various business establishments,
10 such as business establishments **104-108**. Items purchased
or obtained in connection with a service may originate
from a supplier such as supplier **110** or **112**. The
suppliers may be manufacturers, distributors, or some
other entity, which provides items to business
15 establishments **104-108**. The items may take various forms
depending on the particular implementation. For example,
the items may be automotive items, such as oil, tires,
body parts, and various accessories.

  When a customer, such as customer **100**, travels to a
20 business establishment, such as business establishment
104, customer **100** may enter into a physical transaction
with business establishment **104**. With the example of
automotive items, customer **100** may desire details about
the transaction for personal records. These details may
25 include, for example, customer name, customer address,
mileage of vehicle at service time, vehicle
identification, and vehicle year. Also, the description
of the item, as well as the price of the item, also are
typically desired by customer **100**. In this example, a
30 standardized record, such as data structure **114**, is
created by business establishment **104** and sent to customer
100. Data structure **114** is sent electronically. This

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data structure may be sent in a number of different ways, such as, for example, as an electronic mail message attachment to the address for customer **100** or through a wireless data link to a personal digital assistant (PDA)

5   carried by customer **100**.

Additionally, a data structure **116** also may be transmitted to supplier **110** in response to the same physical transaction. Data structure **116** may be a duplicate of data structure **114** or may be modified to

10   protect the privacy of customer **100**. The modification may take out personal identification information such as the customer name and address. Fields within data structures **114** and **116** may include mandatory fields that are found in all data structures used to enable different data

15   processing system systems and programs to receive and import the information form these data structures. The data structures are also referred to as electronic records. If more than one item is present from more than one supplier the a data structure may be sent to each

20   supplier.

With this information a customer may update personal records, such as a database containing a budget or a set of maintenance records. For example, with an oil change, a data structure may be sent to the customer with details

25   about the oil change. A budget database for the customer may be updated automatically upon receiving the data structure.

A supplier receiving the data structure may update its records using the data structure and track the

30   purchase and use of items by different customers. This information may be analyzed to produce statistics on the

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use of items as well as demand for items in different geographic regions.

Turning next to **Figure 2,**   Network data processing system **200** is a network of computers in which the present invention may be implemented. Network data processing system **200** contains a network **202**, which is the medium used to provide communications links between various devices and computers connected together within network data processing system **200**. Network **202** may include connections, such as wire, wireless communication links, or fiber optic cables. Data processing system **200** may be used to interconnect different entities, such as customers, business establishments, and suppliers.

In the depicted example, a server **204** is connected to network **202** along with storage unit **206**. In addition, clients **208, 210,** and **212** also are connected to network **202**. These clients **208, 210,** and **212** may be, for example, personal computers or network computers. In the depicted example, server **204** provides data, such as boot files, operating system images, and applications to clients **208-212.** Clients **208, 210,** and **212** are clients to server **204.** Network data processing system **200** may include additional servers, clients, and other devices not shown. In these examples, server **204** may be located at a business establishment to generate electronic records while clients **208-212** may be located at a customer location or at a supplier location.

In the depicted example, network data processing system **200** is the Internet with network **202** representing a worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another.

At the heart of the Internet is a backbone of high-speed
data communication lines between major nodes or host
computers, consisting of thousands of commercial,
government, educational and other computer systems that
5   route data and messages. Of course, network data
processing system **200** also may be implemented as a number
of different types of networks, such as for example, an
intranet, a local area network (LAN), or a wide area
network (WAN). **Figure 2** is intended as an example, and not
10   as an architectural limitation for the present invention.

Referring to **Figure 3**, a block diagram of a data
processing system that may be implemented as a server,
such as server **204** in **Figure 2**, is depicted in accordance
with a preferred embodiment of the present invention.
15   Data processing system **300** may be a symmetric
multiprocessor (SMP) system including a plurality of
processors **302** and **304** connected to system bus **306**.
Alternatively, a single processor system may be employed.
Also connected to system bus **306** is memory
20   controller/cache **308**, which provides an interface to local
memory **309**. I/O bus bridge **310** is connected to system bus
306 and provides an interface to I/O bus **312**. Memory
controller/cache **308** and I/O bus bridge **310** may be
integrated as depicted.

25   Peripheral component interconnect (PCI) bus bridge
314 connected to I/O bus **312** provides an interface to PCI
local bus **316**. A number of modems may be connected to PCI
bus **316**. Typical PCI bus implementations will support
four PCI expansion slots or add-in connectors.
30   Communications links to network computers **208-212** in
Figure 2 may be provided through modem **318** and network

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adapter **320** connected to PCI local bus **316** through add-in boards.

Additional PCI bus bridges **322** and **324** provide interfaces for additional PCI buses **326** and **328**, from
5   which additional modems or network adapters may be supported. In this manner, data processing system **300** allows connections to multiple network computers. A memory-mapped graphics adapter **330** and hard disk **332** may also be connected to I/O bus **312** as depicted, either
10   directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure** 3 may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in
15   place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure** 3 may be, for example, an IBM RISC/System 6000 system, a product
20   of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) operating system.

With reference now to **Figure 4**, a block diagram illustrating a data processing system is depicted in which
25   the present invention may be implemented. Data processing system **400** is an example of a client computer. Data processing system **400** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus
30   architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used.

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Processor **402** and main memory **404** are connected to PCI
local bus **406** through PCI bridge **408**. PCI bridge **408** also
may include an integrated memory controller and cache
memory for processor **402**. Additional connections to PCI
5   local bus **406** may be made through direct component
interconnection or through add-in boards. In the depicted
example, local area network (LAN) adapter **410**, SCSI host
bus adapter **412**, and expansion bus interface **414** are
connected to PCI local bus **406** by direct component
10   connection. In contrast, audio adapter **416**, graphics
adapter **418**, and audio/video adapter **419** are connected to
PCI local bus **406** by add-in boards inserted into expansion
slots. Expansion bus interface **414** provides a connection
for a keyboard and mouse adapter **420**, modem **422**, and
15   additional memory **424**. Small computer system interface
(SCSI) host bus adapter **412** provides a connection for hard
disk drive **426**, tape drive **428**, and CD-ROM drive **430**.
Typical PCI local bus implementations will support three
or four PCI expansion slots or add-in connectors.
20   An operating system runs on processor **402** and is used
to coordinate and provide control of various components
within data processing system **400** in **Figure 4**. The
operating system may be a commercially available operating
system, such as Windows 2000, which is available from
25   Microsoft Corporation. An object oriented programming
system such as Java may run in conjunction with the
operating system and provide calls to the operating system
from Java programs or applications executing on data
processing system **400**. "Java" is a trademark of Sun
30   Microsystems, Inc. Instructions for the operating system,
the object-oriented operating system, and applications or

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programs are located on storage devices, such as hard disk
drive **426**, and may be loaded into main memory **404** for
execution by processor **402**.

     Those of ordinary skill in the art will appreciate
5   that the hardware in **Figure 4** may vary depending on the
implementation. Other internal hardware or peripheral
devices, such as flash ROM (or equivalent nonvolatile
memory) or optical disk drives and the like, may be used
in addition to or in place of the hardware depicted in
10   **Figure 4**. Also, the processes of the present invention
may be applied to a multiprocessor data processing
system.

     As another example, data processing system **400** may
be a stand-alone system configured to be bootable without
15   relying on some type of network communication interface,
whether or not data processing system **400** comprises some
type of network communication interface. As a further
example, data processing system **400** may be a Personal
Digital Assistant (PDA) device, which is configured with
20   ROM and/or flash ROM in order to provide non-volatile
memory for storing operating system files and/or
user-generated data.

     The depicted example in **Figure 4** and above-described
examples are not meant to imply architectural
25   limitations. For example, data processing system **400**
also may be a notebook computer or hand held computer in
addition to taking the form of a PDA. Data processing
system **400** also may be a kiosk or a Web appliance.

     With reference now to **Figure 5**, a diagram of a
30   client in the form of a personal digital assistant (PDA)
is depicted in accordance with a preferred embodiment of

the present invention. PDA **500** includes a display **502** for presenting textual and graphical information. Display **502** may be a known display device, such as a liquid crystal display (LCD) device. The display may be

5   used to present a map or directions, calendar information, a telephone directory, or an electronic mail message. In these examples, screen **502** may receive user input using an input device such as, for example, stylus **510**.

10   PDA **500** may also include keypad **504**, speaker **506**, and antenna **508**. Keypad **504** may be used to enter user input in addition to using screen **502**. Speaker **506** provides a mechanism for audio output, such as presentation of an audio file. Antenna **508** provides a

15   mechanism used in establishing a wireless communications link between PDA **500** and a network, such as network **202** in **Figure 2**.

        PDA **500** also preferably includes a graphical user interface that may be implemented by means of systems

20   software residing in computer readable media in operation within PDA **500**.

        Turning now to **Figure 6**, a block diagram of a PDA is shown in accordance with a preferred embodiment of the present invention. PDA **600** is an example of a PDA, such

25   as PDA **500** in **Figure 5**, in which code or instructions implementing the processes of the present invention may be located. PDA **600** includes a bus **602** to which processor **604** and main memory **606** are connected. Display adapter **608**, keypad adapter **610**, storage **612**, and audio adapter

30   **614** also are connected to bus **602**. Cradle link **616** provides a mechanism to connect PDA **600** to a cradle used

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in synchronizing data in PDA **600** with another data processing system. Further, display adapter **608** also includes a mechanism to receive user input from a stylus when a touch screen display is employed.

5   An operating system runs on processor **604** and is used to coordinate and provide control of various components within PDA **600** in **Figure 6**. The operating system may be, for example, a commercially available operating system such as Windows CE, which is available from Microsoft

10   Corporation. Instructions for the operating system and applications or programs are located on storage devices, such as storage **612**, and may be loaded into main memory **606** for execution by processor **604**.

         Those of ordinary skill in the art will appreciate

15   that the hardware in **Figure 6** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in

20   **Figure 6**.

         Turning next to **Figure 7**, an illustration of an entry for a data structure is depicted in accordance with a preferred embodiment of the present invention. Entry **700** includes a field name **702**, a field length **704**, and a

25   field **706**. Field name **702** is used to identify the field, while field **704** defines the length of field **706**. Various information may be placed in an entry, such as entry **700**. For example, customer name, a vehicle name, mileage, price, and item description may be placed into field **706**

30   in entry **700**.

         With reference next to **Figure 8**, a data structure is

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illustrated in accordance with a preferred embodiment of
the present invention. In this example, data structure
800 contains a version number **802**, date **804**, time **806**, a
nickname **808**, a cost **810**, work performed **812**, items **814**,
5   payment type **816**, and comments **818**.

In these examples, version number **802**, date **804**, and
time **806** are contained within a header in data structure
800. Based on the version number, an identification of
the size and type of data may be made such that the use
10   of field name and field length definitions, such as those
used in entry **700** in **Figure 7** are unnecessary. Nickname
804 may be used to identify a particular vehicle for a
user. Cost **810**, work performed **812**, and items **814**
identify information about the service itself. Payment
15   type **816** indicates how the customer paid for the service.

Referring to **Figure 9**, a flowchart of a process used
for importing data structures is depicted in accordance
with a preferred embodiment of the present invention. The
process illustrated in **Figure 9** may be implemented in a
20   client data processing system such as data processing
system **400** in **Figure 4** or PDA **600** in **Figure 6**. This
process illustrates an exemplary use by customer of a data
structure in accordance with a preferred embodiment of the
present invention. In this example, the data structure
25   represents a transaction involving service for a vehicle.

The process begins by receiving the data structure
(step **900**). This data structure may be received by the
customer in a number of different ways. For example, the
data structure may be sent to the customer in an
30   electronic mail message. Alternatively, the data
structure may be transferred to the customer PDA through a

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wireless connection prior to the customer leaving the
business establishment.

Next, the data structure is imported for use locally
into the local records (step **902**). The importing of the
5   data structure may be performed using a process or
program, which recognizes the data structure and the
fields within the data structure. With a standardized
data structure, a common process or program may be used by
customers and suppliers. After this step occurs, the
10   transaction is entered into a financial program (step
904). The entry of the transaction into a financial
program in this example involves placing the information
into the database associated with the financial program.
The process importing the information also may place the
15   information within the financial program. In this
example, the process recognizes fields within the data
structure used by the financial program and formats that
information for placement into the financial program.
Finally, the next service date is projected (step **906**).
20   In addition, the information from the data structure may
be used by another program to project another service date
for the vehicle.

Turning now to **Figure 10**, a flowchart of a process
used by a business entity for creating data structures is
25   depicted in accordance with a preferred embodiment of the
present invention. The process illustrated in **Figure 10**
may be implemented in a data processing system at a
business entity. This process may be implemented in a
data processing system, such as data processing system
30   **300** in **Figure 3**.

The process begins by receiving the service item

(step **1000**). The item is one involved in the transaction with the customer. The item may be selected from an inventory database of items available at the business establishment. This item may be received as a selection

5   of the item for sale or use in providing service for a customer. After the item is identified, it is processed (step **1002**). The processing of the item in this example involves removing it from the inventory database. Next, a data structure is created and sent to the customer

10 (step **1004**). This data structure may be, for example, data structure **800** in **Figure 8**. The information within the fields of the data structure may be retrieved from an inventory database or entered by a user in completing the physical transaction with the customer.

15   After this step occurs, the manufacturer for the item is identified (step **1006**). After the aforementioned manufacturer is identified, the data structure is modified (step **1008**). Step **1008** is an optional step in which information may be removed from the data structure

20 to protect the privacy of the customer. For example, the name and other personal information about the customer may be removed from the data structure.

        Next, the modified data structure is sent to the supplier (step **1010**). A determination is made as to

25 whether more manufacturers are present that require information (step **1012**). The physical transaction may involve multiple items supplied by different suppliers. If more suppliers are not present, the process terminates. If, however, more suppliers are needed, the

30 next supplier is selected (step **1014**). After the next supplier is selected, the process returns to step **1008**,

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where the data structure is modified.

The supplier data sent in the process described in **Figure 10** may be sent on a regular basis, such as daily or monthly instead of after each transaction.

5   Turning now to **Figure 11**, a flowchart of a process used by a supplier to receive and process data structures is depicted in accordance with a preferred embodiment of the present invention. This process is used by a supplier, such as a manufacturer or distributor of items

10   to analyze the use and purchase of items.

The process begins by receiving a data structure (step **1100**). This data structure in these examples are received from a business entity, but also may be received from customers. Information is extracted from the data

15   structure (step **1102**). The information is then placed in a database for analysis (step **1104**). This database may contain information for a particular type of item or for all items supplied by the supplier. The database is then analyzed (step **1106**). This analysis may include

20   statistical analysis of the information for various factors, such as what items are purchased more frequently during certain periods of time or in selected geographic regions. Additionally, depending on the information included in the data structure, an analysis of

25   demographics of customers purchasing the items also may be made. Based on this analysis, statistics and projections are generated (step **1108**) with the process terminating thereafter. These statistics and projections may be used by the supplier to make business decisions

30   such as, for example, how much of an item to keep in inventory and whether to keep certain items in inventory

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during certain periods of time.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary

5   skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of

10   signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog

15   communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular

20   data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and

25   variations will be apparent to those of ordinary skill in the art. For example, items may encompass automobiles in addition to parts for automobiles and may extend to non-automotive items, such as perishable goods and building supplies. The embodiment was chosen and

30   described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the

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invention for various embodiments with various
modifications as are suited to the particular use
contemplated.